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Accelerate into another dimension. Produce and troubleshoot metal 3D print

Student Dissertation

How to cite:

Taleo, Wendy (2019). Accelerate into another dimension. Produce and troubleshoot metal 3D print. Research Summary for the Open University module H818 The Networked Practitioner

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FRI: Accelerate into another dimension. Produce and troubleshoot metal 3D print (Wendy Taleo)

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18 December 2018

SPEE3D Printer



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Abstract

A new course has been developed to train operators of the metal 3D printer located on Charles Darwin University Campus in Darwin, Australia. The printer is manufactured by SPEE3D and managed by Advanced Manufacturing Alliance (AMA) (Charles Darwin University, 2018). Students will be required to complete six elements: scan, setup, produce and troubleshoot metal 3D printing according to a National Standard training skill set (training.gov.au, 2018). Troubleshooting is the focus of this presentation.

The title of this presentation alludes to an acceleration of learning as this printer has been designed to shoot powder at approximately three times the speed of sound. The metal 3D printer requires no heat process to fuse the metal together. Troubleshooting techniques will relate to issues impacting the printing of metal parts. With the use of educational technologies, students can use multiple senses to build a library of problem-solving skills for this unique and complex piece of equipment.

Three common troubleshooting aspects have been chosen in the first phase of developing the training material. These are calibrating for new stocks of powder, cloud forming and

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under/overbuilding. It is intended that the training will be available in a blended mode of online and face to face. All outputs need to be compatible with the existing Learning Management System (LMS). Project outputs will include a range of formats. Interactive videos and quizzes will be created in H5P. A narrative will be introduced to guide students through troubleshooting steps in Padlet. Augmented Reality will be designed for the calibrating aspect of the 3D printer.

This unique printer works with materials that can be dangerous if mishandled. Training in troubleshooting will ensure that operators have the skills to provide a safe and successful operation. Augmented Reality Troubleshooting (ART) has been known to accelerate and assist in troubleshooting in complex environments (Vinn, 2018). Using AR for training can be the first step in gaining these benefits.

Using Augmented Reality technology in educational settings can increase motivation and assist with long term memory retention (Leonard & Fitzgerald, 2018). Calibrating is a common troubleshooting activity and has been chosen as best suited to gain benefits from using Augmented Reality. This will allow for the task to be repeated in a safe environment and benefit from memory retention and motivation of the students.

The underlying theme of inclusion influences all parts of the project and the conference presentation. To encourage students to interact with the learning material, transcripts, audio, visual and alternative formats will be created. Accessibility checks will be taken for the material that is available online.

This presentation will provide a dynamic snapshot of the learning experience designed to stimulate and focus on technical troubleshooting. Join this session to see how educational technology can add another dimension to learning.

References

Charles Darwin University. (2018). Advanced Manufacturing Alliance. Retrieved from <https://advancedmanufacturing.cdu.edu.au/>

Leonard, S. N., & Fitzgerald, R. N. (2018). Holographic learning: A mixed reality trial of Microsoft HoloLens in an Australian secondary school. *2018*, 26. doi:10.25304/rlt.v26.2160

training.gov.au. (2018). ICPPRN395 - Set up and produce 3D print. Retrieved from <https://training.gov.au/Training/Details/ICPPRN395>

Vinn, M. (2018, 2 April, 2018). Goggles With a Work Crew Inside. *Bloomberg Finance LP*, 30.

Extra content

Poster.

<https://create.piktochart.com/output/35245790-3d-metal-print>



[W Taleo](#)

12:13 on 12 January 2019

1 minute overview

[W Taleo](#)



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[Munir Moosa Sadruddin](#)

8:10am 19 January 2019 [Permalink](#)

Hi

Your project has lots of future scopes. Since you are developing it for the for-profit course, I am just curious to learn, if there are any future chance to make it available to everyone openly? Where do you see your project in the future?

Also, is there any literature available which endorse that this printer can build a library of problem-solving skills for a general purpose?

What are your plans to assess the outcome of the project?

Munir

Munir



[patrick shearer](#)

7:29pm 20 January 2019 [Permalink](#)

I love this Wendy mainly because it sounds so interesting and innovative. Combine this with the fact that my topic is a million miles away from yours, it is another reason why I am finding H818 so fascinating. The poster is striking and engaging.



[Bernadette Laffey](#)

1:59pm 29 January 2019 [Permalink](#)

Really interested in the idea of AR in training. I can see it being used in recruitment by

employers in the future. I am curious about the costs involved. Is it one of those technologies that will get cheaper and cheaper?



[Bernadette Laffey](#)

1:59pm 29 January 2019 (Edited 2:00pm 29 January 2019) [Permalink](#)

Duplicate



[Kenneth Simpson](#)

6:13am 2 February 2019 [Permalink](#)

AR and VR are both fascinating areas of training, I had a friend who was using AR in medical education, his specific example was the different parts of the ear which you could rotate around on the screen allowing doctors to explain different areas for operation.

They would be time-intensive to deliver though, how are you finding the AR process Wendy?



[W Taleo](#)

6:28am 2 February 2019 [Permalink](#)

Bernadette,

I'm starting at the lower end of AR by using a mobile phone and free app. On the other end of the scale, I'm testing a Microsoft Hololens which has got MORE expensive recently!

Ken,

It's an interesting journey, I'm testing a Hololens and sharing my observations via this [Twitter thread](#). I'll be doing some short training sessions with colleagues soon so that will be good experience.



[Dr Simon Ball](#)

1:55pm 18 February 2019 [Permalink](#)

Hi Wendy

Well done on a great presentation! Here is a summary of the comments and questions you received following your presentation (including those you may have addressed verbally). Please respond in whatever way you choose.

Best wishes

Simon

- ▶ Great job, What do you feel is the advantage for learners?
- ▶ What are the financial barriers from learners viewpoint?
- ▶ Is it possible to integrate this into a school curriculum, or is it still too expensive?
Schools were encouraged to get 3d printers a few years ago but many don't use it and they gather dust

► Are you selling training package to 3D manufacturer?



[W Taleo](#)

5:37am 19 February 2019 [Permalink](#)

Munir,

One of the challenges of this project is that the learning materials are being created for-profit training. However, I am making the learning design open. Students will complete a 3 days course and the augment reality aspect is only part of that. Success/challenges will be measured by the first student cohort feedback. I'm not sure of the aspect of "library of problem-solving skills" but this printer is targetting manufacturing sector for producing parts much faster than possible with other printers.



[W Taleo](#)

5:44am 19 February 2019 [Permalink](#)

Q&A from conference presentation:

1. Advantage: Safety of learning environment and ability to handle virtual simulations instead of the real machine. Motivation for study (the wow factor). Encouraging collaboration, teamwork and discussion when using the AR.
2. Financial barriers - Depending on what type of AR you are using. The institution would be expected to bear the cost of something like Microsoft Hololens. At the moment we are developing learning using a free app HP Reveal and the students would use their own device.
3. Definitely applicable for school curriculum (reference Leonard & Fitzgerald 2018 above). However this is not a plastics 3D printer to print keyrings or small objects. It's a unique manufacturing, metal printer so students are most likely employees of a company that owns a printer.
4. The current training material is being developed for AMA which is an alliance that includes the manufacturer of the printer. I'm not aware of any other manufacturer that is making this type of machine that combines these technologies (world first).

Thank you to everyone for their questions from the conference presentation. We expect our first lot of students in early March 2019.

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